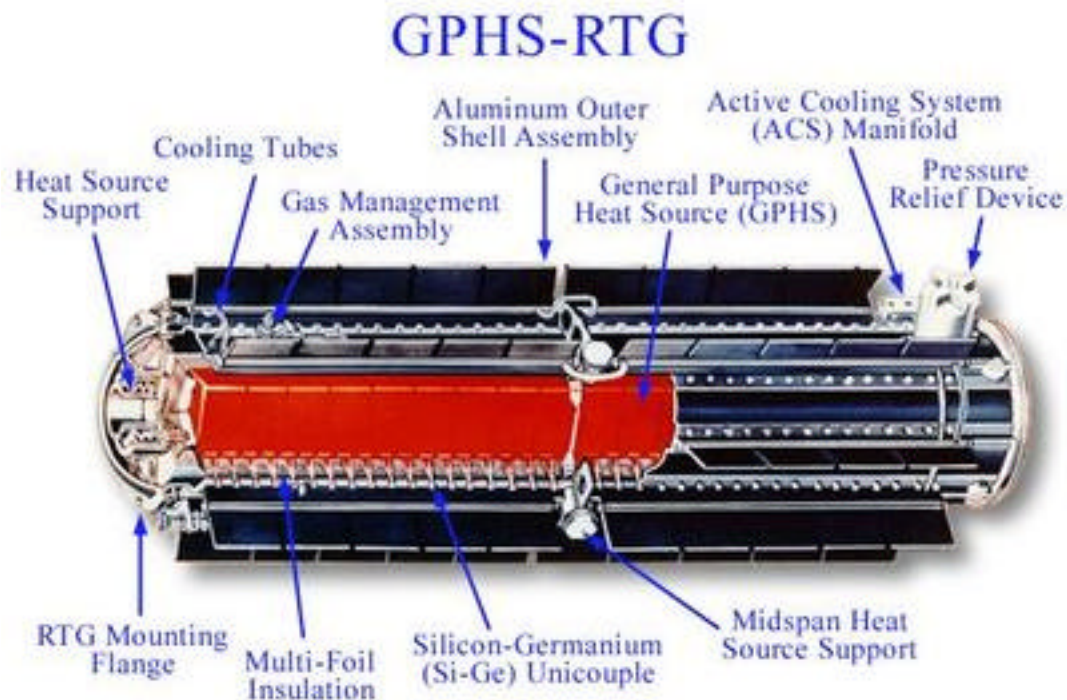


RADIOISOTOPE THERMOELECTRIC GENERATOR (RTG)



OBJECTIVE: To perform the final assembly operations required to complete the critical safety component for this next-generation interplanetary power source

BACKGROUND: The assembly has been pre-fabricated and requires the addition of the critical safety component (fuze) to be tested in order to be put into service

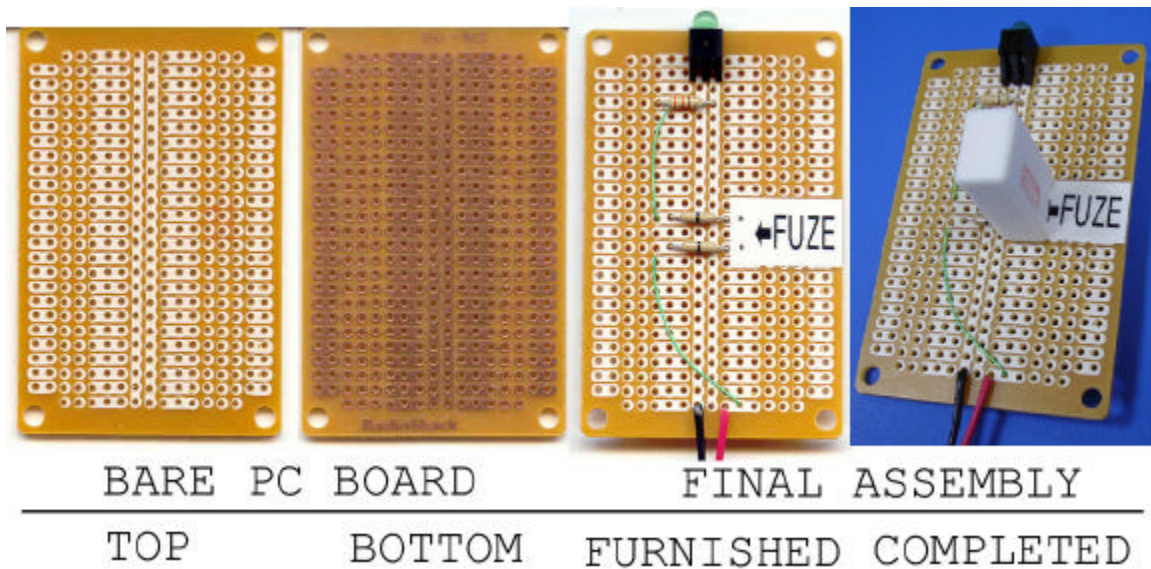
PRECAUTIONS: Due to the sensitive nature of the “fuze” component, it may not be handled by human hands or otherwise contaminated by foreign substances. For this reason, the component is furnished on a carrier pallet and sealed from the environment

PROCEDURE: Design and develop an automated process for handling, placing, installing, soldering and testing the fuze

SPECIFICATIONS:

PRINTED CIRCUIT BOARD

The PC Board is fabricated of copper-clad composite material with dimensions of 1-7/8" by 2-7/8" by 1/16" thickness, and has a protective coating to resist corrosion. It has holes pre-drilled of the correct diameter and spacing to accommodate the component(s) to be installed. It also has 4 mounting holes of 9/64" diameter which may be used for handling, positioning, etc. Components are installed on one side and soldered on the opposite (copper-clad) side, as shown.



COMPONENTS

The fuze component is packaged in a cement-cased ceramic "bathtub" style case measuring approximately 1" x 1/2" x 1/3" and having two wire leads of 0.032" diameter on 0.200" centers. These wire leads extend approximately 0.2" beyond the bottom mounting plane, and may not be cut, bent or formed during the assembly process. Care should be taken to minimize stress on the junction where the leads enter the case.



"Fuze" (DO NOT DROP)

SOLDER and SOLDERING IRON

The solder is a standard 63/37 electronic-grade wire solder, consisting of a high-purity alloy of 63% lead and 37% tin, with an organic rosin flux core. The flux melts when applied and cleans and prepares the metallic surfaces for joining. The flux is non-conductive, non-corrosive and non-toxic.

Solder is typically supplied on 1-pound spools. We will be using wire solder with a diameter of 0.031” in this project.



Please refer to the following reference for more information on the soldering process: <http://www.circuittechctr.com/guides/7-1-1.shtml>

Much more information on electronic soldering is available than can be presented here.

Special note: A voluntary industry initiative called *Restriction of Hazardous Substances (RoHS)* is presently being adopted by many manufacturers of electronic products. One aim of RoHS is to reduce the amount of lead that ends up in landfills and may leach into groundwater.

For this reason, many components and solders are now made with lead-free materials. For our purposes, we will be using standard lead solder and therefore it is essential that you observe handling precautions when using this material. Basically, wash your hands after handling it and before eating or smoking. More information can be found on the product label.

The Iron used is a 25-watt pencil-type, with a tinned, pointed tip. The tip temperature is typically 500-700° F and care must be exercised to avoid burns, personal injury or property damage.



TESTING

The test process is to be completely automated without operator intervention. A diagnostic indicator is present on the assembly that is to be used for verification. This indicator consists of a green LED (light-emitting diode) circuit that is powered by an external 5-volt dc source.

A test connection is provided that, when connected to 5 volts dc, will cause the indicator to light up, which can then be detected by electronic means. The device is considered to have passed the test when the indicator has been illuminated steadily for 15 seconds.

PRACTICE RUNS

The design teams will each be supplied with 1 partially completed assembly that only requires the addition of the fuze, and 1 complete assembly for reference and measurements. If the team requires additional units for setup and testing of their system and/or process, they will have to purchase the bare PC boards. It is recommended that practicing be done on the bare boards to avoid destroying good units. When the system is operational, the teams will need to arrange to have another partial assembly constructed to be used in the final demonstration.

DIAGNOSTIC
INDICATOR

RELATED
COMPONENTS

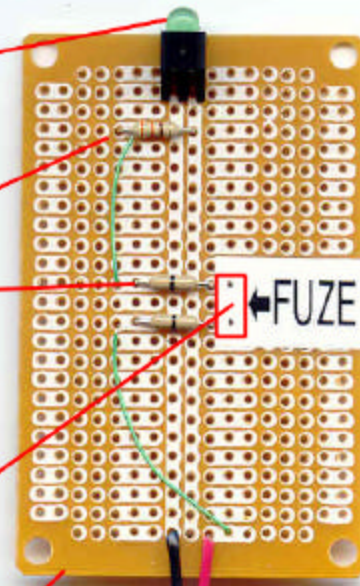
CRITICAL
DEVICE
LOCATION

CIRCUIT
ASSEMBLY

TEST POINT
CONNECTION

RED (+5V)
BLACK (GND)

FITS .025"
SQUARE PINS



FUZE